IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A method of iteratively optimising ~~improving~~ a design function for a grating structure, ~~design function describing a refractive index variation defining a multi-channel grating structure in a waveguide material, the improvement being a reduced maximum refractive index variation in the waveguide material along the grating structure while maintaining a desired functional spectral domain in a spectral response function associated with the design function,~~ the method comprising:

(a) obtaining a first design function describing a refractive index variation defining a multi-channel grating structure in a waveguide material;

(b) ~~modifying a first design function to generate~~ generating a second design function from the first design function, the second design function having a reduced maximum amplitude compared with the first design function;[[,]]

(c) determining a second response function associated with the second design function, the second response function describing a spectral response of the grating structure defined by the second grating function;

(d) replacing selected parts of ~~modifying~~ the second response function to create a third response function having predetermined spectral characteristics in a functional portion of the ~~a desired functional~~ spectral domain~~, and~~;

(e) determining a third design function associated with the third response function[[,]]; and

(f) repeating steps (b) to (e) ~~iterating the method steps until the desired improvement is achieved~~, wherein the third design function of the previous iteration is taken as ~~takes the place of~~ the first design function of the ~~next~~ current iteration, and wherein the iterative repetition continues until predetermined quality criteria are satisfied, the quality criteria comprising a reduction of a maximum refractive index variation in the waveguide material along the

waveguide structure and the preservation of the predetermined spectral characteristics in the functional portion of the spectral domain.

2. (Currently Amended) A method as claimed in claim 1, wherein the step of replacing selected parts of ~~modifying~~ the second response function comprises replacing the ~~corresponding spectral domain~~ selected parts of the second response function by ~~the~~ a predefined spectral response ~~desired functional spectral domain~~.

3. (Currently Amended) A method as claimed in ~~claim 1~~claim 2, wherein the predefined spectral response ~~desired functional spectral domain~~ comprises a portion of ~~corresponding spectral domain of~~ a first response function ~~associated with~~ describing a spectral response of the grating structure defined by the first design function.

4. (Currently Amended) A method as claimed in claim 1, wherein the step of obtaining the first design function ~~the method~~ comprises ~~the pre-iteration step of~~ determining the first design function from a ~~or the associated~~ first response function describing a spectral response.

5. (Previously Presented) A method as claimed in claim 1, wherein the determining of the response functions from the design functions comprises solving a direct scattering problem, and the determining of the design functions from the response functions comprises solving an inverse scattering problem.

6. (Currently Amended) A method as claimed in claim 1, wherein the step of replacing selected parts of ~~modifying~~ the second response function to create the third response function is conducted in a manner such that the third response function has a desired response

characteristic in at least one portion of the spectral domain other than the functional portion of the spectral domain.

7. (Currently Amended) A method as claimed in claim 6, wherein the step of ~~modifying~~ replacing selected parts of the second response function comprises replacing the corresponding at least one portion of the spectral domain with ~~the desired~~ a predetermined response characteristic.

8. (Currently Amended) A method as claimed in claim 1, wherein the step of ~~modifying~~ generating a second design function from the first design function comprises applying at least one of a normalisation process or an averaging process to the first design function.

9. (Currently Amended) A method as claimed in claim 8, wherein the normalisation ~~normalising~~ process comprises replacing an amplitude function $\kappa(z)$ of the design function by a product of the square root of a constant A and a corresponding single-channel seeding amplitude function $\kappa_s(z)$, while maintaining a phase function of the design function.

10. (Original) A method as claimed in claim 9, wherein the constant A is defined by a normalisation condition.

11. (Original) A method as claimed in claim 10, wherein A is defined by the normalisation condition $A = \int_0^l \kappa^2 dz \,/\, \int_0^l \kappa_s^2 dz$, where l is a length of the multi-channel grating structure.

12. (Original) A method as claimed in claim 8, wherein the averaging process comprises averaging over a sampling or quasi-sampling period of the design function.

13. (Currently Amended) A method as claimed in ~~claim 1~~ claim 8, wherein the normalising or averaging process ~~processes~~ is ~~complimented~~ complemented or replaced by a nonlinear transform reshaping operation, which reduces $\kappa_{\max}(z)$ while keeping the parameter $\int_0^l \kappa^2 dz$ substantially unchanged.

14. (Currently Amended) A method of fabricating a multi-channel grating structure, the method comprising ~~improving~~ iteratively optimising a grating design function describing a refractive index variation defining the multi-channel grating structure in a waveguide material as claimed in claim 1.

15. (Currently Amended) A multi-channel grating structure fabricated utilising a method of fabrication as claimed in ~~claim 1~~ claim 14.

16.-18. (Canceled)